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Financial Intermediation in the Pre-Consolidated Banking Sector in Nigeria

Heiko Hesse*

World Bank

Abstract: This paper uses unique bank-by-bank balance sheet and income statement information to investigate the intermediation efficiency in the Nigerian pre-consolidated banking sector during 2000-2005. The author analyzes whether the Central Bank of Nigeria's policy of recent banking consolidation can be justified and rationalized by looking at the determinants of spreads. Indeed, a spread decomposition and panel estimations show that the reform of the banking sector could be the first step to raise the intermediation efficiency of the Nigerian banking sector. The author finds that larger banks have enjoyed lower overhead costs, increased concentration in the banking sector has not been detrimental to the spreads, both increased holdings of liquidity and capital might have led to lower spreads in 2005, and a stable macroeconomic environment is conducive to a more efficient channeling of savings to productive investments.

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* World Bank: hhesse@worldbank.org.
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I. Introduction

The Nigerian banking sector has experienced a boom-and-bust cycle in the past 20 years. After Nigeria implemented the Structural Adjustment Program (SAP) in 1986, and the Central Bank of Nigeria (CBN) deregulated the financial sector, new banks proliferated, mainly driven by attractive arbitrage opportunities in the foreign exchange market. But relative to the pre-deregulated period, financial intermediation never took off and even declined in the 1980s and 1990s. With the bursting of the bubble during the early 1990s in a very volatile macroeconomic environment, Nigeria's banking sector was still characterized by a high degree of fragmentation and low levels of financial intermediation up to 2004.

This paper is motivated by the CBN's recent reforms to consolidate the banking sector by drastically increasing the minimum capital requirements from 2 billion Nigerian Naira (NN) to NN25 billion ($ US 190 million). This led to a remarkable reduction of the number of banks from 89 to 25, mainly by mergers and acquisitions, by the beginning of 2006 in a very short period of time.

We use unique bank-by-bank balance sheet and income statement information from the CBN to investigate the intermediation efficiency in the pre-consolidated banking sector during 2000-2005. We aim to analyze whether the CBN's policy of banking consolidation can be justified and rationalized by looking at the determinants of spreads.

Interest rate spreads are often used as proxies for the efficiency of financial intermediation. If there were no market frictions and transaction costs, lending and deposit rates would be equal. But since screening and monitoring borrowers is costly, there is a wedge between the lending and deposit rates.

Our findings provide some evidence that indeed it was the right decision of the CBN to radically change the market structure of the banking sector. A spread decomposition shows that spreads have been coming down in the past years, together with an overall decline in lending and deposit rates. Larger banks have especially enjoyed lower overhead costs that have materialized in higher profit margins and also charge lower spreads than smaller banks.

The panel estimations indicate that spreads are negatively related to equity and liquidity in 2005 as well as to banking concentration. Unlike findings from previous studies (e.g Martinez Peria and Mody, 2004) that increased holdings of liquidity are foregone interest income which banks attempt to recover from borrowers in the form of higher spreads and that excessive capital holdings can be costly for banks, leading to higher spreads, Nigerian banks are flush with liquidity and equity so increased competition for lending outlets might have reduced the spreads in 2005.

Also, there has been no evidence that increased banking concentration has been detrimental to the spreads in the pre-consolidated banking sector. Furthermore, higher overhead costs lead to an increase of spreads. Overall, spreads are driven by bank-specific, banking industry-level factors as well as macroeconomic variables. We find strong evidence that inflation, the real Treasury bill rate and partly a weaker exchange rate are positively related to the spreads. Therefore, a stable macroeconomic environment is potentially conducive to a higher level of financial intermediation.

With the consolidation, banks' profit margins are likely to be slowly eroded, and increased bank holdings of liquidity as well as equity will put further pressure on the spreads, thus potentially raising the intermediating potential of the 25 banks that remained from the original 89 banks. It is also likely that economies of scales among the merged banking entities will be materialized, potentially causing a sizable reduction in overhead costs that could eventually also increase the intermediating efficiency.

We complement the main panel estimations with extensive robustness and sensitivity tests in order to check the validity of the main results. The paper is organized as follows: Section II provides a short literature overview, and section III describes some developments in the Nigerian banking industry. Next, the data and methodology is explained in section IV followed by the results and robustness tests in sections V and VI, respectively. Finally, section VII concludes.

II. Literature Overview

There are not many econometric studies that investigate the spreads and margins in African countries. This is often due to a lack of adequate panel data for commercial banks. Among some of the studies are Birungi (2005) and Beck and Hesse (2006) on Uganda. The latter analyze Ugandan bank spreads and margins from 1999-2005 and find that spreads and margins have been mainly driven by time invariant bank characteristics as well as overhead costs and sectoral compositions of loans. Another example is Chirwa and Mlachila (2004) who investigate bank margins in Malawi after the financial liberalization. The authors consider different definitions for the margins and find that the determinants of the margins in Malawi often depend on the particular margin definition used. Finally, Enendu (2003) analyzes ex-ante commercial bank interest rates spreads in Nigeria. He finds that macroeconomic and monetary policy/ financial regulation factors were more important than bank-specific factors. Given the small sample of banks (13 in total) the results are not representative for the whole Nigerian banking sector.

The related literature on the determinants of margins and spreads is abundant, and in the following we only mention some of the key papers. The seminal paper is by Ho and Saunders (1981) who develop a dealership model of bank spreads where banks are risk-averse and balance the deposit and loan markets. Since loans and deposits have different maturity profiles, banks charge a fee (spread) for the provision of liquidity under uncertainty.

On the empirical front, Demirguc-Kunt and Huizinga (1999) in a cross-country study find evidence for a strong positive relationship between nonfinancial costs such as overhead costs and margins. According to the evidence of Hannan and Liang (1993) as well as Barajas et al (1999, 2000) margins are positively related to market power. But there is also some evidence that market structure indicators such as Herfindahl indices or concentration ratios are not good indicators of the competitiveness and contestability of banking systems. For instance, Claessens and Laeven (2004) show there is a lack of correlation between concentration ratios and competitiveness in banking sectors. Market structure indicators do not take into account segmentation in the banking system or threat of entry from new institutions.[1]

[1] Also, Herfindahl indices do not convey any information about efficiency per se.

Brock and Rojas-Suarez (2000) and Saunders and Schumacher (2000) show that reserve requirements are positively related to spreads in some Latin American and developing countries since reserve requirements can be seen as an implicit tax on banks. The results on the link between margins and provision for bad debts have been more mixed. On the one hand, there has been some evidence by Brock and Rojas-Suarez (2000) for a negative relationship in Argentina and Peru that the authors explain with deficient banking supervision and past poor provisioning for loan losses. On the other hand, Barajas et al (1999) suggest that banks could charge higher spreads by shifting costs for screening and monitoring to borrowers. Furthermore, Martinez Peria and Mody (2004) find for their Latin American panel that the entry of foreign banks has led to lower margins.

Cross-country comparisons have shown that the contractual and informational environments affect not only the level but also efficiency of financial intermediation. For instance, Demirguc-Kunt et al (2004) and Laeven and Majnoni (2005) find that countries with less efficient legal systems and more limited credit information sharing have higher spreads and margins. Furthermore, inflation is often found to be positively related to margins and spreads especially in developing countries with high and volatile inflation rates. (For instance, see Demirguc-Kunt and Huizinga (1999) and Claessens et al (2001)

This paper is also related to a small literature on the financial sector in Nigeria. Lewis and Stein (1997, 2002) provide a political economy explanation for the financial liberalization in the late 1980s and the subsequent burst of the bubble. Beck et al (2005) analyze the effects of banking privatization (initiated in 1992) on banking performance during 1990-2001 and find that out of 14 privatized banks, the performance of 9 banks significantly improved after the privatization.

III. Developments in the Nigerian Banking Sector

In this section, we will give a brief overview of the main developments and trends in the Nigerian banking sector.[2] Nigeria had its first banking legislation in 1952, and the CBN started operations including banking regulation in 1959. In the 1970s the Nigerian banking sector was faced with the government's introduction of various control measures such as the nationalization of many foreign-owned banks, an entry restriction, a deposit rate floor or an interest rate ceiling (Beck at al, 2005).

In 1986 Nigeria implemented the Structural Adjustment Program (SAP) in which World Bank and IMF prescriptions comprised a currency devaluation, trade liberalization and privatization of state enterprises among others. In this context, some of the direct control measures from the 1970s were loosened such as entry restrictions or interest rate controls. Before the financial deregulation began in 1986, the banking sector has been described as static for almost 10 years with 29 commercial banks owning 60% of total banking assets and the rest represented by 12 merchant institutions (see also Lewis and Stein, 1997).

The financial liberalization saw the entry of many new banking institutions. For instance, the number of banks increased from 40 banks in 1985 to over 100 banks in 1990 (table 1). One of the reasons was the parallel exchange rate regime due to the perceived overvaluation of the domestic currency which allowed banks to quickly make profits from various arbitrage opportunities. Hereby, banks with connections to the political elite often had preferred access to exchange rate auctions and could sell the foreign exchange for a high premium especially in relation to increased trade-related financing after the SAP and the implemented trade liberalization.

Although the contribution of the financial sector to GDP increased after the financial deregulation and even surpassed the manufacturing share in GDP by 1990 (Lewis and Stein, 1997), the Nigerian financial sector actually saw a financial disintermediation. Many of the new banks were not interested in intermediating funds from depositors to lenders but rather made quick profits from the arbitrage and other rent-seeking activities (often not legal). According to table 1, bank assets, private credit or financial system deposits as share of GDP were lower in 1990 than in 1985.

[2] Brownbridge and Harvey (1998) provide a comprehensive overview of financial sector reform in Nigeria.

As a consequence of the high fragmentation and low financial intermediation, the Nigerian authorities established some prudential guidelines in 1990-91 and a moratorium on new bank licenses in 1991. The financial bubble burst as stock market prices fell sharply, and the extent of non-performing loans became evident. For example, during 1992-93, the Nigeria Deposit Insurance Corporation (established 1988) announced that 24 banks were insolvent and 26 in serious trouble; these 50 banks had two-thirds of total banking assets and three-quarters of deposits in Nigeria's financial system (Lewis and Stein, 1997). Also, according to Caprio and Klingebiel (2003), Nigeria faced a systemic banking crisis throughout the 1990s. Nigeria's financial indicators such as liquid liabilities, bank assets, private credit or financial system deposits therefore remained relatively low throughout the 1990s by historical standards and the 1985 figures and only started to significantly increase after 2000 (table 1).

In 1998, 26 bank licenses were revoked, reducing the total number of banks from 115 to 89. Even though the macroeconomic environment improved with a new civilian government regime after 1999, the Nigerian financial system was still characterized by very high fragmentation and low financial intermediation.

In this context, the CBN decreed on July, 6, 2004 that banks had to increase their minimum capital requirements from NN2 billion to NN25 billion ($ US 190 million) by the end of 2005. The intention was to increase the average size of banks via merger and acquisitions to materialize economies of scales, create new product development and overall generate a more stable banking system with a higher contribution to financial intermediation. By the beginning of 2006, the number of banks shrank from 89 to 25 banks with 14 banks from the original 89 banks failing to increase their capital or secure merger partners. For many foreign-owned banks, the new capital requirements were achieved by capital injections from the parent company. Also, in the process of the banking consolidation, banks raised over $ US 3 billion on the Nigerian stock market. Banks became flush with excess liquidity and equity.

Going forward, it is expected that the previous very high profit margins from often non-lending activities will be eroded, and many banks are likely to enter the retail lending market or expand their geographical scope into other regions in West Africa.

IV. Data and Methodology

We have quarterly balance sheet and income statement data from the CBN on all 89 Nigerian banks from 2000-2005 that allows us to investigate which bank-specific, industry and macroeconomic characteristics were the main drivers for the spreads in Nigeria. We look at the efficiency of financial intermediation especially the effects of overhead costs, bank-specific liquidity and capital holdings as well as the competitive structure of the banking industry on spreads.

Accounting Decomposition

As a first exercise following Beck and Fuchs (2004), we conduct an accounting decomposition of the interest rate spread. Similar to Martinez Peria and Mody (2004), we define the spread as the difference between interest income received on loans (divided by total loans) and the interest expenses paid on deposits (divided by total deposits).

Unlike Beck and Fuchs (2004), we do not have information on ex-ante contracted interest rates so both the implicitly calculated lending and deposit rates are ex-post since they are based on the ex-post balance sheet and income statement information of the Nigerian banks. Therefore, we assume that the ex-post spread already accounts for portfolio quality, that is, loan loss provisions do not appear as a factor in the accounting decomposition.[3]

However, spreads depend on the tax rate, reserve requirements, overhead costs and the profit margin. The tax rate is calculated from the actual tax payments of the banks, that is, one minus the after-tax over the pre-tax income, and the reserve requirement is 10%. We use the overhead costs attributable to loans and identify those by calculating the share of loan interest revenue to total revenue. In other words, the relevant overhead costs are equal to the share of loan income multiplied by total overhead costs over total loans. The profit margin is a residual after accounting for all the components and can be expressed as follows (Beck and Fuchs, 2004):

Profit Margin= (1-tax rate) x (implicit lending rate- implicit deposit rate/ (1- reserve requirement)- overhead costs attributable to loans),

[3] In the panel estimations, we will rectify this by including loan loss provisions as an explanatory factor for the interest rate spreads.

where the implicit lending rate corresponds to the first component of the above-defined spread, and the implicit deposit rate to the second component. Beck and Fuchs (2004) rearrange the above formula to obtain the implicit spread as a function of the reserve requirement, overhead costs, profit margin and tax rate. Finally, the figures in the spread decomposition tables are based on simple averages across individual banks.[4]

Econometric Model

Secondly, following Ho and Saunders (1981), Martinez Peria and Mody (2004) and other authors, we estimate a general class of regressions for the spreads of the form

$$Spread_{i,t} = \alpha + \beta B_{i,t} + \gamma I_t + \delta M_t + \varepsilon_{i,t}$$

where i indexes bank i and t indexes time t; $B_{i,t}$ is a vector of bank-specific variables for bank i and time t; I_t contains time varying, banking industry- specific variables; M_t is a vector of time-variant macroeconomic variables, and $\varepsilon_{i,t}$ is the residual. Finally, we control for year and seasonal effects by including yearly dummy variables and dummy variables for each quarter in all model specifications except the models that contain macroeconomic variables.

We will estimate the spread equations with both pooled OLS and mainly fixed effects regressions, where we control for time-invariant bank-specific effects.[5] For both the OLS and fixed effects regressions, we will allow for clustered standard errors across observations of the same bank, that is, we will relax the condition that error terms of observations of the same bank are independent of each other. Given the dispersion of data and to control for the potential effect of outliers, we will use alternative econometric techniques in our robustness analysis. Specifically, we will use median least square regressions and robust regressions that both control for the effect of outliers.

[4] Therefore, while the profit margin is an accounting residual for each bank, it is not necessarily equal to the simple residual for the sector as a whole.

[5] The problem with pooled OLS is that it is inconsistent if $E(x\eta) \neq 0$, and even if $E(x\eta)=0$, it is inefficient because of serial correlation in the error terms $\varepsilon = \eta + v$ where η captures the time invariant unobserved heterogeneity among the observations, v is the residual error component with the classical standard assumptions and $x = (\alpha, B, I, M)$.

In the academic literature, many definitions for spreads exist, and in the following we will make usage of two commonly used spread expressions.[6] Firstly and as defined above, we follow Martinez Peria and Mody (2004) and define the narrow interest rate spread as the difference between interest income received on loans (divided by total loans) and interest paid on deposits (divided by total deposits). Secondly, we calculate a wider spread measure which is defined as the difference between total interest income over total earning assets and total interest expenses over total interest bearing liabilities.[7] This gives a broader picture of the efficiency of financial intermediation in the Nigerian banking sector. Finally, we add fees and commission to the wide spread measure for robustness analysis but do not present the findings here.

Figure 1 shows the quarterly development of the various spread measures weighted by the loan share of individual banks from 2000-2005. During our sample period, the different spreads exhibit a similar trend and have decreased after some mild peak in the beginning of 2002. As expected, the wide spread that includes fees and commission is higher than the spread measure without fees throughout the sample period. The fact that the narrow spread has been higher than the wide spread measures until 2003 gives the interesting finding that during 2000-2003 Nigerian banks have enjoyed higher spreads in their loan and deposit market segments than their spreads from sources other than lending. This gap has somewhat closed after 2003.

As bank-specific explanatory variables we use *overhead* as the ratio of overhead costs to total assets and anticipate that a higher overhead leads to higher spreads since banks usually pass on these costs to the borrowers. *Liquidity* is defined as liquid assets over deposits. For their Latin American sample, Martinez Peria and Mody (2004) find a positive relationship between liquidity and spreads since banks with holdings of liquid assets bear higher opportunity costs, and they pass on these costs to borrowers. We also

[6] See Brock and Rojas Suarez (2000) as well as Chirwa and Mlachila (2004) for a discussion of different margin definitions. Ideally, we also would have liked to use the ex-ante interest rate spreads as well but this data was not available.

[7] Specifically, total earning assets includes total due from other banks, short-term investments, certificates of deposits, discounted bills, other financial instruments, net loans and advances, and investments (other than short-term). Total interest bearing liabilities includes money at call, interbank takings, total deposits and takings, total due to other banks, certificates of deposits, other loans and advances from financial institutions, debentures, and other liabilities.

employ the equity/ assets *(equity)* ratio, and according to Martinez Peria and Mody (2004), higher equity or capital holdings due to either banks' voluntary decisions or regulation could be costly for banks so a positive relationship should be usually expected. Banks typically use multiple sources of funding and besides deposits, equity is an important source of funding. If banks hold excessive capital, their opportunity costs could increase and lead banks to charge higher spreads.

In this context, the announcement of new capital requirements by the CBN on July 6, 2004, meant that banks had to increase their minimum capital from NN2 billion to NN25 billion before the end of 2005. So banks engaged in merger and acquisitions or raised more capital on the stock market with the consequence that they obtained abundant excess liquidity and equity. This development might put pressure on the spreads charged as competition among banks for lending business intensified. Therefore, unlike previous studies we expect that spreads are negatively associated with our liquidity and equity measure. As illustration, figure 2 plots the historical development of the equity/ assets ratio in the Nigerian banking sector. We observe a sharp increase after 2004.

Since the effects of the new capital requirements on the banks' liquidity and equity only materializes after 2004, we specifically calculate interaction variables between liquidity, equity and the years 2004 and 2005 in order to observe any explicit effect of liquidity and equity movements in both years on the various spread measures.[8]

We define *loan loss provisions* as provision for bad debt relative to recoveries over total loans. Since both interest rate income and expenses are ex-post items on the banks' income statements we anticipate that higher loan loss provisions should decrease the implicitly calculated spreads.

Furthermore, the variable *market share deposits* is each bank's market share in the deposit market segment. If banks are able to use market power, we would expect a positive sign as these banks can charge higher spreads. In contrast, with economies of

[8] One potential concern for the interpretation of the interaction terms might be that there will not be sufficient bank observations in 2004 or 2005 due to the merger and acquisition activities so it would be unclear what the coefficients of the interaction terms would be picking up. We are not affected by the sample size of banks in 2004 or 2005. For example, in the third quarter of 2005 we have data for 84 banks so the coefficients of the interaction terms should be able to pick up any effect of liquidity or equity on the interest spreads.

scale, larger banks might enjoy substantial cost savings and pass these lower costs to borrowers so we would expect a negative sign.

We also include some measures for the diversity of banks' activities by including the *interest income share*, defined as total interest income over total operating income and *intermediation*, defined as total loans over total liabilities. According to Laeven and Levine (2005), a specialized loan-making bank will have a larger interest income share, while a specialized investment bank is expected to have a larger share of other operating income. If the Nigerian lending market is subject to more competitive pressure, specialized loan-making banks are better able to absorb this competition so we anticipate a negative relationship between the interest income share and the spreads. Also, banks that are more involved in intermediation of loans should be better prepared for competition and charge lower spreads so we again expect a negative association between intermediation and the various spread measures.

For measures of banking concentration, we include the *Herfindahl* index in the deposit and lending market segment.[9] Figure 3 gives a graphical overview of the development of bank concentration in Nigeria. In comparison to many African countries, bank concentration has been very low in Nigeria. [10] Only with the announcement of the new capital requirements in 2004 and the ensuing merger and acquisition activities have we seen increased Herfindahl indices in both the deposit and lending market.

Finally, we account for potential effects of macroeconomic developments by including variables such as annualized quarterly *inflation*, the *real Treasury bill rate*, the quarterly *industrial production growth* rate as well as the *exchange rate depreciation* (proxied by its quarterly growth rate).[11] In the past, Nigeria has experienced a very volatile macroeconomy and changes in the industrial production index as a proxy for GDP growth attempt to capture any business cycle effects that might have an effect on bank spreads. Similarly, inflation can affect spreads if monetary shocks are not passed

[9] The Herfindahl is the sum of squared market shares in the deposit or the loan market segment, scaled by 10,000. It ranges from 0 to 1. We scale the Herfindahl in order to make it more comparable with the scale of the dependent variables.
[10] According to Cihak and Podpiera (2005) and for illustration, the Herfindahl indices in loans were 0.105 for Kenya, 0.112 for Tanzania and 0.160 for Uganda in June 2002. After the privatization of the government-owned bank UCB, Uganda's Herfindahl index for deposits has increased to over 0.200 (Beck and Hesse, 2006).
[11] The macroeconomic data is from the IMF International Financial Statistics Database.

through the same extent to deposit and lending rates, or adjustment occurs at different speed. The real Treasury bill rate proxies for the marginal cost of funds, and this benchmarks for interest rate decisions by banks. The real T-bill rate could also proxy for alternative investment opportunities of banks. Finally, banks' balance sheets are affected by movements in the exchange rates. The appendix provides an overview of all the main variables in the panel regressions.

The balance sheet and income statement data of the Nigerian banks in the sample are subject to a wide dispersion of observations among certain variables. Therefore, similar to Beck et al (2005), we remove these potential outliers from the summary statistics, correlation analysis and subsequent panel estimations. Upon inspection of the data, the 1st and 99th percentiles of the distribution of both the narrow and wide spread are excluded, the 99th percentile of the distribution of liquidity, loan loss provisions and interest income share is excluded as well as the negative observations for the equity variable are excluded.

Table 2 gives some summary and correlation statistics of the main variables in the panel estimations used. From panel A, we observe a higher mean and volatility of the narrow spread versus the wide spread. This also mirrors the graphical inspection of the spreads in figure 1. The ratio of overhead costs to assets averages 6% throughout the sample period. Also, despite truncating the distribution of both liquidity and loan loss provisions at the 99th percentile, the variables still exhibit some substantial volatility at the top end of their observations. The average market share in the deposit segment is negligible at 1% with the highest market share being 20%. This is not surprising given the high degree of fragmentation in the Nigerian banking market with a total of 89 banks. Annualized quarterly inflation averages 14.4%, the average real Treasury bill rate is close to zero but experienced some substantial variation throughout the sample period with a range of -18.4% to 18.9%. Also, industrial production averages 0.9% per quarter on average, whereas the exchange rate was subject to a 1.2% depreciation per quarter on average.

The findings from the correlation analysis in panel B of table 2 might anticipate some of the signs and significance levels in the subsequent panel estimations. While overhead costs are significantly positively correlated with the narrow and wide spreads,

liquidity, loan loss provisions and the Herfindahl index for the deposit markets are significantly negatively correlated with the spread measures. Unlike our prior hypothesis, the equity variable is positively related to the spread measures so the effect of increased equity holdings after the new capital requirements is not picked up by the correlation. As expected, the interest income share and intermediation proxy are all negatively correlated with the spreads though not necessarily significantly in some cases. Finally, there is an issue of multicollinearity between both Herfindahl indices in the deposit and lending segment so the variables will not be used together in the panel estimations. As a cautionary remark, correlation findings do not necessarily reflect causal relationships, especially since they are not able to account for other explanatory factors.

V. Results

Results from Accounting Decomposition

Table 3 shows the interest rate decompositions by year for the full sample and the ex-post narrow spread measure. As mentioned before, the figures in the spread decomposition tables are based on simple averages across individual banks.

There is some evidence that the implicit lending rates have come down over the years 2001-2005 and so have deposit rates to a lesser extent, overall resulting in a decreasing spread. Both taxes and reserve requirements can only explain a very small percentage of the spread behavior in contrast to overhead costs which accounts for a sizable proportion of the spread. Since there is no clear discernible trend in overhead costs, the reductions in the spread is mainly driven by lower profit margins which have halved from 2001 to 2005. Some possible explanations for lower bank profit margins could be the improved macroeconomic environment during the sample period and more competition in the loan and deposit market segment.

In contrast to the spread decomposition by years in table 3, table 4 offers a spread decomposition based on total asset size for the third quarter of 2005 in order to capture possible differences in the determinants of spreads for small vs. larger banks. Why do we specifically choose the third quarter of 2005? As mentioned before, one of the interests in this paper is to predict or anticipate how financial intermediation of the Nigerian banking

sector will evolve in the post-consolidated period. The third quarter of 2005 might offer a good snapshot to assess the differences of small and large banks before the new capital requirements became effective in January 2006.

The implicit deposit rates and also to a certain extent the lending rates of larger banks are lower than smaller banks in 2005 III, resulting in lower spreads for the larger banks. Also, larger banks enjoy significantly lower overhead costs than smaller banks due to possible economies of scale effects. Despite lower spreads, larger banks earn higher profit margins than smaller banks, mainly driven by their low overhead costs. Similar to the spread decomposition by years, taxes and reserve requirements can only explain a small percentage of the variation of the spread.

Even though table 4 only provides a snapshot, the results suggest that larger banks might be more successful in efficiently channeling funds from depositors to borrowers than smaller banks. With the consolidation of the banking sector that saw the 89 banks being reduced to 25 banks, overhead costs should be expected to further decrease as economies of scale effects will be materialized. The increased competition among the larger 25 banks for deposits and profitable outlets for their abundant liquidity, will most likely drive down profit margins so further lowering spreads.

Of course, the interest rate decompositions in table 3 and 4 were based on an accounting exercise, and we did not include loan loss provisions since the interest rate spread was an ex-post measure of the interest income and expenses. The panel estimations will offer a more insightful approach in capturing the determinants of the interest rate spreads by including bank-specific (including loan loss provisions), banking industry- specific and macroeconomic variables.

Results from Panel Estimations

Table 5 presents the pooled OLS and fixed effects results for the narrow spread and table 6 for the wide spread measure. As mentioned before, all regressions include yearly and quarterly dummy variables, and we report t-values based on clustered standard errors as well as R^2 with and without bank dummies (since the R^2 of the fixed effects models exclude the cross section variation due to the bank dummies).[12] Except column 1, all regressions use bank- level fixed effects.

There is some strong evidence that higher overhead costs lead to both higher narrow and wider spreads, as banks pass on these additional costs to borrowers. Loan loss provisions have a significantly negative effect on both spread measures in all model specifications. This is not surprising since the spreads are an ex-post measure so increased provisions for bad debts should result in lower interest income on the banks' income statements. Also, after controlling for overhead costs we do not observe any evidence that larger banks (in terms of market share in deposits) either charge significantly lower or higher spreads.

The effect of liquidity on the narrow spread is mixed and unclear whereas higher banks' liquid holdings appear to decrease the wide spread, even though this effect is often not significant. Equity does not significantly influence the spreads even though the signs are predominantly negative.

To better capture any possible effects of liquidity and equity in the context of the announcement of new capital requirements and subsequent merger and acquisition activities among Nigerian banks during 2004 and 2005, we interact both liquidity and equity variables with the yearly dummy variables 2004 as well as 2005. Column 3 in table 5 and 6 gives the result for liquidity. For the narrow spread measure in table 5, the effect of both interaction variables is negative but insignificant and of small magnitude whereas for the wide spread in table 6, only the interaction with 2005 is negative and close to being significant but also with a small economic magnitude.

Column 4 in tables 5 and 6 shows the relevant findings for the interaction of equity and the yearly dummy variables in 2004 and 2005. Overall, equity movements in

[12] As stated before, models that have macroeconomic control factors do not include yearly or quarterly dummy variables in order not to distort the effects of the macroeconomic variables.

2005 had a negative effect on both the narrow and wide spread, even though the effect is not significant in the model specifications with bank-level fixed effects. Estimating the narrow and wide models in columns 3 and 4 with pooled OLS instead yields significantly negative coefficients for the interaction terms of liquidity and equity with the 2005 year dummy (Results available on request). It might be the case that the fixed effects regressions are not able to pick up the effect of liquidity*2005 and equity*2005. We will come back to this precise issue in the robustness section.

The negative signs of liquidity*2005 and equity*2005 are in contrast to previous research in the area (such as Martinez Peria and Mody, 2004) which on the one hand, finds a positive relationship between liquidity measures and spreads due to banks' foregone interest income that is recovered from borrowers in form of higher spreads, and on the other hand, obtains a positive relationship between equity and spreads since excessive capital holdings can be costly for banks.

Overall, the negative sign of liquidity*2005 and equity*2005 confirms our prior hypothesis that banks with increased equity holdings which were also more likely to have higher liquidity due to the announced capital requirements could have been looking for lending and investment opportunities and might have lowered their spreads in 2005. We elaborate on and reinforce the above argument in the robustness section. [13]

Column 5 includes both the interest income share and the intermediation proxy. As expected, more loan-specializing banks charge lower narrow and wide spreads even though the effect is only significant for the wide spread measure. Unlike investment banks that generate their income mainly from activities other than lending, loan-specializing banks are more able to react to competitive pressure and therefore charge lower spreads. Similarly, banks with a higher intermediating role, that is, have a higher lending portfolio relative to their total liabilities, also charge lower spreads.

From column 6 and 7, there is some strong evidence that a higher bank concentration in the Nigerian deposit and lending market segments has led to

[13] Due to the merger negotiations during the transition year 2005 and raising money in capital markets, some Nigerian banks were known to have been recalling some of their loan exposures. Therefore, this might be initially a complementary explanation for the negative relationship between liquidity and equity and the ex-post spreads in 2005. But then we would expect a significantly negative correlation between equity as well as liquidity holdings and the loan growth rate during 2004 and 2005. This is not the case. In addition, the regressions already account for loan loss provisions so the effect of equity and liquidity on the spreads can be seen as the 'pure' effect.

significantly lower narrow and wide spreads.[14] This finding is quite interesting in light of the Nigerian consolidation exercise since it might indicate that a more concentrated banking sector as we find today after the implementation of the new capital requirements might indeed be potentially beneficial for increasing financial intermediation in Nigeria and lowering banking spreads. We are aware that the Herfindahl index has its caveats in capturing banking concentration such as its inability to account for market segmentation, efficiency considerations or threat of entry from new institutions (See Claessens and Laeven, 2004). But the consistency of the results across different spread definitions makes us somewhat confident that indeed there might be some benefit by having a more concentrated banking system after controlling for overhead costs. Of course, another caveat from this conjecture is that the pre-consolidated period faced a different market structure from the current market structure after 2006 so it might well be the case that findings from the pre-consolidated Herfindahl might not be projected to the post-consolidated period.

Finally, column 8 incorporates some macroeconomic control variables. We do find some strong evidence that both the inflation and real Treasury bill rate were key drivers of both spread measures during 2000-2005. The positive effect of the inflation rate on the spreads could be potentially explained by the fact that monetary shocks are not passed through the same extent to deposit and lending rates. Also, higher real Treasury bill rates lead to an increase of banks' marginal costs of funds. Banks will incorporate these higher funding costs in their lending rates so this might cause the higher spreads. Also, higher t-bill rates might constitute an alternative investment opportunity for banks and might led to some substitution towards the T-bill market and away from pure lending. Finally, there is some evidence that a weakening exchange rate is associated with a higher wide spread but not narrow spreads.

Also, an inspection of the coefficients in both the narrow and wide spread regressions reveals that coefficients magnitude are in general lower for the wide spread measure. This might be explained by the fact that the explanatory factors are more suited to explain the narrow spread since it is based on only interest income from loans and

[14] We note that the Herfindahl indices are scaled by 10,000 to allow for a more adequate measurement of the coefficient size.

expenses from deposits. The wide spread measure includes total earnings assets as well as total interest bearing liabilities, and the explanatory variables are probably less able to explain a wider range of the banks' interest generating and paying activities.

VI. Robustness Tests

In this section, we briefly analyze whether the reported findings from above are robust to different estimation methods and also to the alternative wide spread definition that does include interest rate fees and charges. We employ the same samples and model specifications in the robust and MLS regressions as in tables 5 and 6, that is, the same exclusion criteria are adopted as well as the same variables used.

We use two alternative estimation techniques to control for the impact of outliers. Firstly, the robust estimation technique uses all observations available, but assigns different weights to avoid the impact of outliers (Beck, Cull and Jerome, 2005). Specifically, through an iterative process, observations are weighted based on the absolute value of their residuals, with observations with large residuals being assigned smaller weights. Secondly, the median least squares (MLS) estimator minimizes the median square of residuals rather than the average and thus reduces the effect of outliers. A look at Table 2, panel A, confirms that the median and mean differ quite a lot for many variables.

Tables 7 and 8 present the panel estimations based on the robust estimation technique. Most of the main previous findings hold which can be viewed as a very strong result given the usual data problems surrounding bank balance sheet and income statement data from developing countries especially in Africa. To focus on a few results, there is now some evidence that banks with higher liquidity holdings charge lower narrow and wider spreads in 2004 and 2005. The interaction term of liquidity with the year dummy 2005 is significantly negative for both the narrow and wider spreads which provides additional support for the hypothesis that banks subject to increased liquidity holdings might have been for looking for lending outlets and lowered spreads. A small caveat is that unlike the sizable economic effect of overhead costs on spreads, the economic magnitude of liquidity is rather small.

Similarly, the interaction variable equity*2005 is significantly negative for both spread measures. As argued before, the new minimum capital requirements led banks to raise substantial new equity on the capital markets or by merging with competitors. So in combination with their potential quest for deposits and lending outlets as liquidity holdings soared, spreads came down.

The MLS regressions in tables 9 and 10 provide a similar picture as the robust estimations, and the findings for the interaction of liquidity and equity with the year dummy 2005 actually become stronger. To add to the consistency of the empirical findings, we calculate another wide spread measure that includes interest fees and charges so giving a more complete picture of the banks' spreads from their interest income and expenses. Again, we find that the previous results hold (results are available on request). Finally, we estimated fixed effects models for large banks only. Specifically, we only included bank observations of banks in two types of models where the total assets size was in the upper 50^{th} or 75^{th} percentiles, respectively. The main findings hold for both the narrow and wide spread measures. Interestingly, the effect of equity on the spreads in 2005 becomes more significantly negative which might indicate that larger banks potentially charged lower spreads than an average bank before the new capital requirements became effective in 2006. Overall, the robustness tests have reinforced our line of argumentation from the previous section.

VII. Conclusion

This paper has analyzed the individual bank spreads from 2000-2005 in Nigeria in the context of the banking consolidation that saw the banking sector shrink from 89 to 25 banks by January 2006. Even though there is no available data yet for the post-reform consolidated banking sector, our analysis provides some evidence that the CBN's decision to increase the minimum capital requirements could be justified.

From the spread decomposition, we observe that larger banks have enjoyed lower overhead costs than smaller banks and also charged lower spreads. Also, profit margins have come down during 2000-2005. The spread regressions showed that especially in 2005 both liquidity and equity holdings are negatively related to spreads. We explained

this by banks' likely incentives to increase their liquidity and equity before the new law on capital requirements took effect on January 1st, 2006. Thus, banks that were looking for lending and investment outlets probably charged lower spreads.

We also find that an increased banking concentration, as measured by the Herfindahl index in the deposit and lending market segments, has not led to higher spreads. Another key finding in this paper is the importance of overhead costs as well as the macroeconomic environment in explaining spreads. High overhead costs are positively related to high spreads in all model specifications. Also, low inflation and real treasury bill rates as well as a stable exchange rate can be conducive to lower spreads and therefore cause a more efficient channeling of savings to productive investments. Overall, we bear in mind that 2005 can be seen as a transition year for the Nigerian banks so besides financial intermediation, banks were also in merger negotiations as well as raised substantial money on capital markets.

What might be the likely effect of the new capital requirements and banking environment on the financial intermediation capacity of the banking sector in the near future? On the one hand, banks are flush with excess liquidity and are highly overcapitalized so there will be some aggressive competition for profitable lending opportunities, potentially leading to further decreasing spreads. With the merger and acquisition activity during the banking consolidation, synergies and cost savings and therefore lower overhead costs could also lower spreads in the future.

On the other hand, there are still some major obstacles in permanently increasing financial intermediation especially to the poor. An uncertain macroeconomic environment could potentially be detrimental for efficient financial intermediation. Also, from a micro perspective, there is no credit information bureau or adequate identification scheme that allows banks to screen their borrowers. Furthermore, the absence of a central land registry makes it hard for banks to verify a borrower's claim of a particular property ownership that is intended for loan collateral. The registration of mortgages is also very difficult. These legal problems could undermine an efficient degree of financial intermediation and maintain a high wedge between lending and deposit rates.

Table 1: Financial Indicators in Nigeria

	Liquid liabilities	Deposit Money Bank assets	Private Credit	Financial system deposits	Number of banks
1985	27.04%	25.78%	14.79%	20.52%	40
1990	19.51%	11.59%	11.88%	13.73%	107
1991	21.08%	11.24%	11.45%	15.11%	119
1992	19.87%	11.11%	11.64%	14.29%	119
1993	25.01%	16.05%	13.88%	17.37%	119
1994	25.88%	17.50%	12.39%	16.43%	116
1995	15.98%	11.42%	9.18%	9.80%	115
1996	12.86%	9.99%	8.42%	8.12%	115
1997	13.83%	11.57%	9.69%	9.07%	115
1998	16.71%	13.71%	11.83%	11.12%	89
1999	18.47%	16.23%	12.25%	12.93%	89
2000	18.44%	16.33%	10.96%	13.31%	89
2001	25.14%	20.46%	14.89%	18.07%	89
2002	26.78%	22.36%	16.10%	19.33%	89
2003	24.78%	20.84%	14.60%	17.31%	89
2004	24.59%	21.40%	15.47%	17.33%	89

Source: Updated version of the Financial Structure Database (World Bank) by Beck et al (2000) and number of banks by Lewis and Stein (2002) and own data. Liquid liabilities are over GDP. Bank assets are claims by deposit money banks on the domestic real nonfinancial sector as a share of GDP. Private credit is by deposit money banks and other financial institutions to GDP. Financial system deposits are defined as demand, time and saving deposits in deposit money banks and other financial institutions as a share of GDP.

Table 2: Summary Statistics and Correlation

Panel A: Summary Statistics

Variable	Observations	Mean	Median	Std. Dev.	Minimum	Maximum
Narrow Spread	1862	0.189	0.164	0.172	-0.150	1.092
Wide Spread	1864	0.105	0.095	0.069	-0.058	0.398
Overhead	1904	0.057	0.049	0.038	0.000	0.743
Liquidity	1888	0.864	0.781	0.435	0.022	3.862
Loan Loss Provisions	1888	0.156	0.050	0.326	-2.573	3.120
Market Share Deposits	1907	0.013	0.006	0.021	0.000	0.204
Equity	1907	0.132	0.111	0.094	0.000	0.906
Interest Income Share	1880	1.203	1.058	0.739	0.000	8.733
Intermediation	1907	0.355	0.350	0.145	-0.642	0.915
Herfindahl Deposits	24	0.047	0.044	0.011	0.036	0.076
Herfindahl Loans	24	0.035	0.032	0.007	0.028	0.052
Inflation	24	0.144	0.138	0.067	-0.019	0.285
Real Treasury Bill Rate	23	0.007	0.016	0.085	-0.184	0.189
Industrial Production Growth	23	0.009	0.003	0.031	-0.042	0.074
Exchange Rate Depreciation	24	0.012	0.004	0.025	-0.025	0.077

Source: Own calculations based on CBN data

Note: The summary statistics are calculated for the sample period 2000 I-2005 IV; The 1st and 99th percentiles of the distribution both the narrow and wide spread are excluded; the 99th percentile of the distribution liquidity of loan loss provisions and interest income share is excluded; negative observations for the equity variable are excluded.

Panel B: Correlation Table

	Narrow Spread	Wide Spread	Overhead	Liquidity	Loan Loss Provisions	M. S. Deposits	Equity	Int. Inc. Share	Inter-mediation	HHI Deposits	HHI Loans
Narrow Spread	1										
Wide Spread	0.600***	1									
Overhead	0.186***	0.263***	1								
Liquidity	-0.040*	-0.122***	-0.110***	1							
Loan Loss Provisions	-0.126***	-0.115***	0.230***	0.0201	1						
Market Share Deposits	-0.033	-0.057**	-0.135***	0.011	-0.048**	1					
Equity	0.042*	0.002	0.029	0.138***	-0.141***	-0.240***	1				
Interest Income Share	-0.022	-0.054**	-0.043*	-0.177***	0.001	-0.121***	0.149***	1			
Intermediation	-0.221***	-0.005	0.019	-0.519***	0.053**	-0.233***	0.017	0.241***	1		
Herfindahl Deposits	-0.067**	-0.091***	-0.032	0.018	-0.006	0.114***	-0.015	-0.074***	-0.023	1	
Herfindahl Loans	-0.011	-0.031	-0.035	0.040*	0.008	0.118***	-0.040	-0.063***	-0.042*	0.871***	1
Observations:	1806										

Source: Own calculations based on CBN data

Notes: The 1st and 99th percentiles of the distribution of the narrow spread are excluded; the 99th percentile of the distribution of liquidity, loan loss provisions and interest income share is excluded; negative observations for the equity variable are excluded.

* significant at 10%; ** significant at 5%; *** significant at 1%;

Table 3: Interest Rate Decompositions by Year

	2001	2002	2003	2004	2005
Implicit Lending Rate	32.14%	36.59%	27.24%	27.23%	24.10%
Implicit Deposit Rate	12.00%	13.43%	11.37%	11.21%	9.54%
Spread	20.14%	23.16%	15.87%	16.01%	14.56%
Overhead Costs	6.59%	8.38%	6.96%	7.48%	7.56%
Profit Margin	11.29%	12.30%	7.20%	6.63%	5.51%
Taxes	0.16%	0.09%	-0.11%	0.11%	0.04%
Reserve Requirement	1.33%	1.49%	1.26%	1.25%	1.06%
Observations	317	341	341	343	313

Source: Own calculations based on CBN data

Table 4: Interest Rate Decompositions by Assets in 2005 III

	1st-25th percentile	26th-50th percentile	51st-75th percentile	76th-100th percentile
Implicit Lending Rate	25.11%	21.73%	25.61%	19.48%
Implicit Deposit Rate	8.69%	10.19%	10.20%	5.60%
Spread	16.42%	11.54%	15.41%	13.88%
Overhead Costs	9.46%	7.14%	8.83%	4.72%
Profit Margin	6.80%	2.84%	5.42%	7.56%
Taxes	0.21%	-0.35%	-0.07%	0.09%
Reserve Requirement	0.97%	1.13%	1.13%	0.62%
Observations	21	21	21	21

Source: Own calculations based on CBN data

Table 5: Regression Results- Narrow Interest Rate Spreads

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Overhead	1.174	1.131	1.093	1.088	1.041	1.139	1.139	1.421
	(0.002)***	(0.003)***	(0.003)***	(0.003)***	(0.017)**	(0.002)***	(0.002)***	(0.000)***
Liquidity	-0.016	0.022	0.032	0.03	-0.06	0.022	0.022	0.026
	(0.280)	(0.137)	(0.039)**	(0.045)**	(0.004)***	(0.137)	(0.140)	(0.108)
Loan Loss Provisions	-0.092	-0.09	-0.092	-0.092	-0.067	-0.09	-0.09	-0.091
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Market Share Deposits	0.039	-0.789	-0.658	-0.642	-1.455	-0.687	-0.693	-0.495
	(0.846)	(0.169)	(0.295)	(0.315)	(0.004)***	(0.249)	(0.252)	(0.484)
Equity	0.093	-0.104	-0.134	-0.105	-0.051	-0.086	-0.086	-0.122
	(0.206)	(0.119)	(0.057)*	(0.292)	(0.457)	(0.213)	(0.221)	(0.179)
Liquidity* 2004			-0.004					
			(0.768)					
Liquidity* 2005			-0.006					
			(0.733)					
Equity* 2004				-0.03				
				(0.787)				
Equity*2005				-0.057				
				(0.568)				
Interest Income Share					-0.009			
					(0.262)			
Intermediation					-0.538			
					(0.000)***			
Herfindahl Deposits						-1.177		
						(0.098)*		
Herfindahl Loans							-1.483	
							(0.127)	
Inflation								0.542
								(0.000)***
Real Treasury Bill Rate								0.622
								(0.000)***
Industrial Production Growth								-0.005
								(0.957)
Exchange Rate Depreciation								0.056
								(0.691)
Constant	0.144	0.142	0.115	0.114	0.425	0.212	0.208	0.046
	(0.000)***	(0.000)***	(0.000)***	(0.001)***	(0.000)***	(0.000)***	(0.000)***	(0.226)
Observations	1,828	1,828	1,828	1,828	1,806	1,828	1,828	1,770
Root MSE	0.161	0.144	0.144	0.144	0.136	0.144	0.144	0.144
R-squared	0.122	0.118	0.113	0.113	0.212	0.119	0.119	0.106
R-Squared incl. Bank Dummies		0.334	0.330	0.331	0.407	0.335	0.335	0.347
Type of Regression	OLS	FE	FE	FE	FE	FE	FE	FE

Robust p values in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Table 6: Regression Results- Wide Interest Rate Spread

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Overhead	0.563	0.64	0.624	0.613	0.62	0.648	0.65	0.89
	(0.001)***	(0.002)***	(0.002)***	(0.003)***	(0.005)***	(0.002)***	(0.001)***	(0.000)***
Liquidity	-0.021	-0.004	0.001	0.00002	-0.017	-0.004	-0.004	0.001
	(0.004)***	(0.584)	(0.864)	(0.997)	(0.009)***	(0.567)	(0.543)	(0.840)
Loan Loss Provisions	-0.041	-0.025	-0.026	-0.026	-0.024	-0.026	-0.026	-0.029
	(0.000)***	(0.018)**	(0.016)**	(0.022)**	(0.032)**	(0.014)**	(0.016)**	(0.003)***
Market Share Deposits	0.001	0.072	0.137	0.135	-0.05	0.139	0.16	0.138
	(0.988)	(0.722)	(0.442)	(0.455)	(0.803)	(0.488)	(0.434)	(0.493)
Equity	0.05	-0.038	-0.046	-0.028	-0.014	-0.028	-0.024	-0.047
	(0.186)	(0.277)	(0.187)	(0.546)	(0.670)	(0.441)	(0.519)	(0.232)
Liquidity* 2004			0.004					
			(0.488)					
Liquidity* 2005			-0.012					
			(0.117)					
Equity* 2004				0.018				
				(0.663)				
Equity*2005				-0.061				
				(0.191)				
Interest Income Share					-0.007			
					(0.039)**			
Intermediation					-0.073			
					(0.002)***			
Herfindahl Deposits						-0.762		
						(0.004)***		
Herfindahl Loans							-1.309	
							(0.000)***	
Inflation								0.335
								(0.000)***
Real Treasury Bill Rate								0.321
								(0.000)***
Industrial Production Growth								-0.039
								(0.345)
Exchange Rate Depreciation								0.131
								(0.018)**
Constant	0.1	0.08	0.066	0.066	0.126	0.125	0.138	0.013
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.371)
Observations	1,831	1,831	1,831	1,831	1,810	1,831	1,831	1,772
Root MSE	0.062	0.053	0.053	0.053	0.051	0.052	0.052	0.052
R-squared	0.185	0.196	0.187	0.187	0.216	0.201	0.203	0.21
R-squared incl. Bank Dummies		0.444	0.438	0.438	0.464	0.448	0.449	0.476
Type of Regression	OLS	FE	FE	FE	FE	FE	FE	FE

Robust p values in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Table 7: Robust Regression Results- Narrow Interest Rate Spread

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Overhead	1.286	1.242	1.206	1.122	1.295	1.294	1.107
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Liquidity	-0.019	-0.008	-0.016	-0.079	-0.02	-0.02	-0.016
	(0.012)**	(0.291)	(0.041)**	(0.000)***	(0.011)**	(0.010)**	(0.041)**
Loan Loss Provisions	-0.083	-0.083	-0.083	-0.062	-0.083	-0.082	-0.081
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Market Share Deposits	0.252	0.262	0.287	-0.286	0.273	0.274	0.241
	(0.096)*	(0.087)*	(0.060)*	(0.056)*	(0.073)*	(0.072)*	(0.135)
Equity	0.159	0.136	0.213	0.209	0.17	0.172	0.177
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Liquidity* 2004		-0.014					
		(0.234)					
Liquidity* 2005		-0.032					
		(0.012)**					
Equity* 2004			-0.07				
			(0.315)				
Equity*2005			-0.195				
			(0.001)***				
Interest Income Share				-0.015			
				(0.001)***			
Intermediation				-0.335			
				(0.000)***			
Herfindahl Deposits					-0.948		
					(0.110)		
Herfindahl Loans						-1.422	
						(0.085)*	
Inflation							0.587
							(0.000)***
Real Treasury Bill Rate							0.659
							(0.000)***
Industrial Production Growth							-0.022
							(0.842)
Exchange Rate Depreciation							0.026
							(0.853)
Constant	0.099	0.073	0.073	0.299	0.159	0.166	0.026
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.173)
Observations	1,828	1,828	1,828	1,806	1,828	1,828	1,770
R-squared	0.178	0.166	0.169	0.249	0.18	0.179	0.128

p values in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Table 8: Robust Regression Results- Wide Interest Rate Spread

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Overhead	0.793	0.768	0.744	0.735	0.798	0.801	0.747
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Liquidity	-0.021	-0.014	-0.019	-0.027	-0.021	-0.021	-0.019
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Loan Loss Provisions	-0.039	-0.038	-0.039	-0.035	-0.039	-0.039	-0.041
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Market Share Deposits	0.084	0.088	0.103	0.022	0.097	0.100	0.086
	(0.160)	(0.148)	(0.089)*	(0.723)	(0.104)	(0.095)*	(0.175)
Equity	0.078	0.061	0.107	0.087	0.084	0.086	0.068
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Liquidity* 2004		-0.009					
		(0.050)*					
Liquidity* 2005		-0.026					
		(0.000)***					
Equity* 2004			-0.037				
			(0.188)				
Equity*2005			-0.137				
			(0.000)***				
Interest Income Share				-0.008			
				(0.000)***			
Intermediation				-0.017			
				(0.122)			
Herfindahl Deposits					-0.714		
					(0.002)***		
Herfindahl Loans						-1.078	
						(0.001)***	
Inflation							0.345
							(0.000)***
Real Treasury Bill Rate							0.341
							(0.000)***
Industrial Production Growth							0.002
							(0.964)
Exchange Rate Depreciation							0.129
							(0.019)**
Constant	0.08	0.066	0.065	0.103	0.125	0.131	0.021
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.005)***
Observations	1,831	1,831	1,831	1,810	1,831	1,831	1,772
R-squared	0.31	0.283	0.289	0.309	0.315	0.315	0.252

p values in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Table 9: Median Least Square Regression Results- Narrow Interest Rate Spread

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Overhead	1.45	1.448	1.386	1.181	1.488	1.475	1.38
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Liquidity	-0.031	-0.017	-0.024	-0.085	-0.031	-0.029	-0.027
	(0.000)***	(0.013)**	(0.001)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Loan Loss Provisions	-0.093	-0.083	-0.088	-0.063	-0.093	-0.092	-0.087
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Market Share Deposits	0.22	0.239	0.224	-0.326	0.242	0.191	0.15
	(0.124)	(0.073)*	(0.130)	(0.035)**	(0.143)	(0.219)	(0.269)
Equity	0.138	0.103	0.207	0.206	0.153	0.137	0.185
	(0.000)***	(0.002)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Liquidity* 2004		-0.018					
		(0.092)*					
Liquidity* 2005		-0.026					
		(0.018)**					
Equity* 2004			-0.161				
			(0.019)**				
Equity*2005			-0.224				
			(0.000)***				
Interest Income Share				-0.01			
				(0.024)**			
Intermediation				-0.373			
				(0.000)***			
Herfindahl Deposits					-1.226		
					(0.062)*		
Herfindahl Loans						-1.868	
						(0.026)**	
Inflation							0.609
							(0.000)***
Real Treasury Bill Rate							0.645
							(0.000)***
Industrial Production Growth							-0.039
							(0.682)
Exchange Rate Depreciation							0.057
							(0.632)
Constant	0.106	0.078	0.084	0.315	0.183	0.195	0.019
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.229)
Observations	1,828	1,828	1,828	1,806	1,828	1,828	1,770

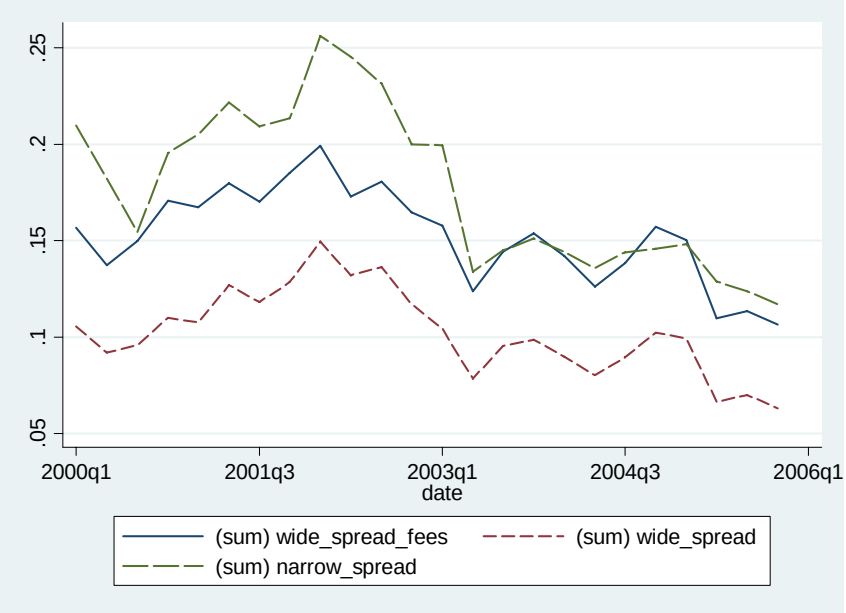
p values in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Table 10: Median Least Square Regression Results- Wide Interest Rate Spread

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Overhead	0.681	0.655	0.646	0.613	0.646	0.637	0.738
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Liquidity	-0.022	-0.016	-0.021	-0.029	-0.022	-0.023	-0.021
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Loan Loss Provisions	-0.043	-0.044	-0.042	-0.032	-0.043	-0.04	-0.043
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Market Share Deposits	0.042	0.056	0.093	0.001	0.071	0.078	0.067
	(0.434)	(0.332)	(0.147)	(0.990)	(0.241)	(0.187)	(0.294)
Equity	0.057	0.045	0.091	0.075	0.071	0.074	0.055
	(0.000)***	(0.002)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.001)***
Liquidity* 2004		-0.011					
		(0.019)**					
Liquidity* 2005		-0.024					
		(0.000)***					
Equity* 2004			-0.035				
			(0.237)				
Equity*2005			-0.128				
			(0.000)***				
Interest Income Share				-0.007			
				(0.000)***			
Intermediation				-0.019			
				(0.086)*			
Herfindahl Deposits					-0.682		
					(0.004)***		
Herfindahl Loans						-0.937	
						(0.003)***	
Inflation							0.324
							(0.000)***
Real Treasury Bill Rate							0.315
							(0.000)***
Industrial Production Growth							-0.016
							(0.715)
Exchange Rate Depreciation							0.193
							(0.001)***
Constant	0.091	0.079	0.076	0.112	0.134	0.135	0.026
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.001)***
Observations	1,831	1,831	1,831	1,810	1,831	1,831	1,772

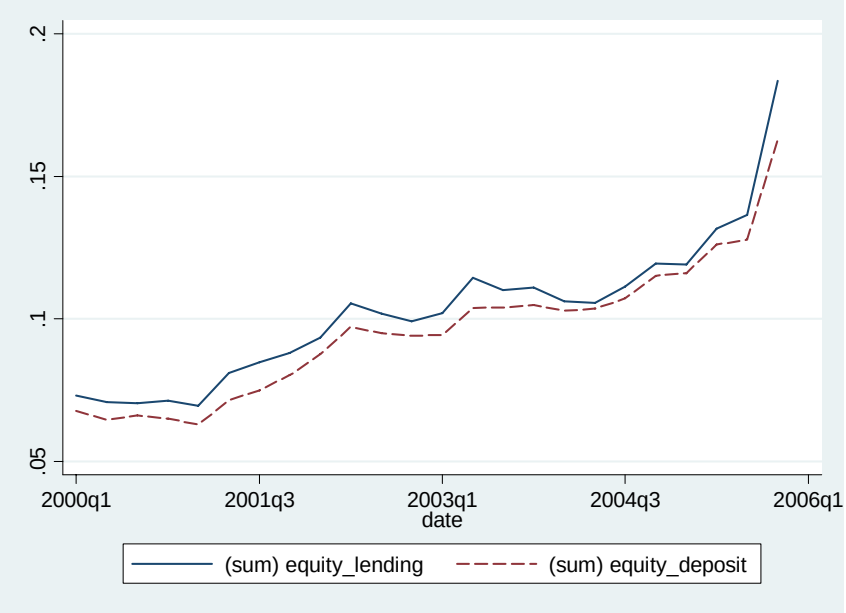
p values in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Figure 1: Nigerian Spreads, 2000-2005



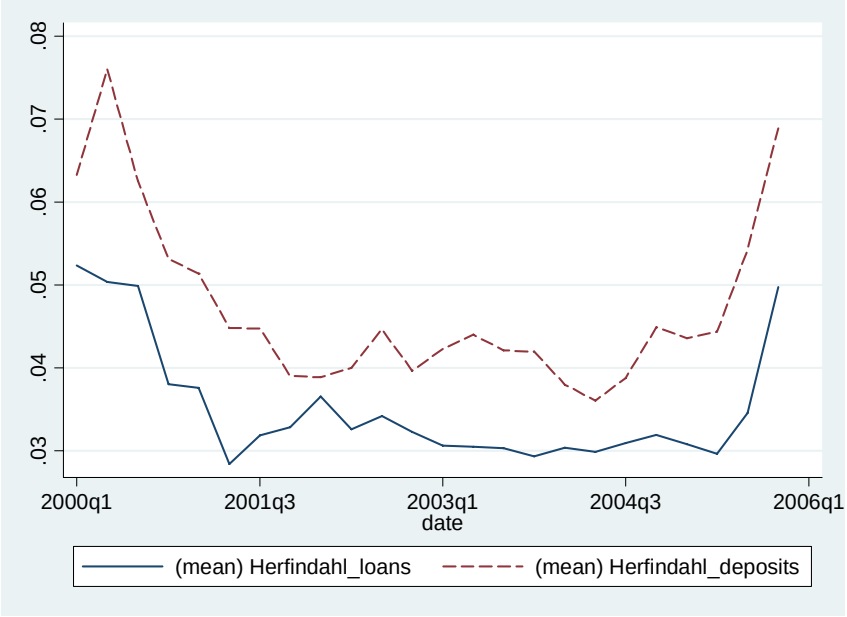
Source: Own calculations based on CBN data
The spreads are weighted by their loan share.

Figure 2: Equity/ Asset Ratio 2000-2005



Source: Own calculations based on CBN data
The equity measure is weighted by their loan and deposit share

Figure 3: Herfindahl Indices in the Nigerian Banking Market, 2000-2005



Source: Own calculations based on CBN data
The Herfindahl index is calculated as the summation of the individual banks' market shares squared, scaled by 10,000. The Herfindahl in the deposit market is given by *herfindahl_deposits* and in the lending market by *herfindahl_loans.*

Appendix: Variable Definitions and Sources

Variable Name	Description	Source
Narrow Interest Rate Margin	Difference between interest income received on loans (divided by total loans) and interest paid on deposits (divided by total deposits)	Central Bank of Nigeria (CBN) and author's calculations
Wide Interest Rate Margin	Difference between total interest income over total earning assets and total interest expenses over total interest bearing liabilities.	CBN and author's calculations
Overhead	Overhead costs over total assets	CBN and author's calculations
Liquidity	Liquid assets over deposits	CBN and author's calculations
Equity	Total equity over total assets	CBN and author's calculations
Liquidity*2004, Liquidity*2005	Interaction of liquidity variable with year dummy	CBN and author's calculations
Equity*2004, Equity*2005	Interaction of equity variable with year dummy	CBN and author's calculations
Loan Loss Provisions	Provisions for bad debt relative to recoveries over total loans	CBN and author's calculations
Market share deposits	Bank's market share in the deposit market segment	CBN and author's calculations
Interest Income Share	Total interest income over total operating income	CBN and author's calculations
Intermediation	Total loans over total liabilities	CBN and author's calculations
Herfindahl deposits/ loans	Sum of squared market shares of banks in the deposit or the loan market segment, scaled by 10,000. The Herfindahl ranges from 0 to 1.	CBN and author's calculations
Inflation	Annualized quarterly change of the CPI index	IMF International Financial Statistics Database
Real T-Bill Rate	The nominal treasury bill rate adjusted for the inflation rate	IMF International Financial Statistics Database
Industrial Production Growth	Quartely growth rate of industrial production index	IMF International Financial Statistics Database
Exchange Rate Depreciation	Quarterly growth rate of Nigerian Naira (NN) per US$	IMF International Financial Statistics Database

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